# GETTING STARTED

A Guide For New Users

**8842A**

*MULTIMETER*

FLUKE

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# G E T T I N G S T A R T E D

A New User's Guide

# 8842A

*MULTIMETER*

FLUKE

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THIS MANUAL introduces you to the Fluke 8842A Digital Multimeter and gives a brief introduction to remote programming using the IEEE-488 Interface option.

For more complete operating and programming instructions, please refer to the 8842A Instruction Manual.

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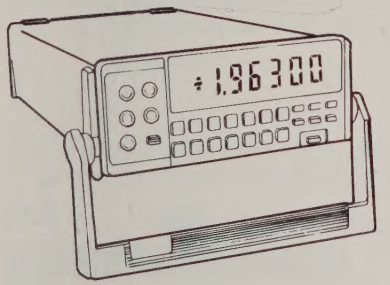
# THE 8842A DIGITAL MULTIMETER

The 8842A is the top-of-the-line DMM in the 8840A family. Using proprietary thin film resistor networks, a stable reference amplifier and stable active components, the 8842A offers superior measurement performance and stability. It also offers additional 20 mV, 20 ohm and 200 mA dc ranges.



Features of the 8842A include:

- Highly legible vacuum fluorescent display
- Intuitively easy front panel operation
- Basic dc accuracy of 0.003% for 1 year
- 2-wire and 4-wire resistance measurement
- DC current measurement
- Up to 100 readings per second
- Closed-case calibration (No internal adjustments)
- Built-in self-tests

Options, which can be installed at any time, include the IEEE-488 Interface (option 8842A-05) and the True RMS AC Converter (option 8842A-09, which lets you measure ac voltage and current).

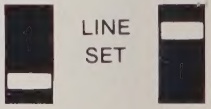
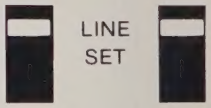
# SETTING UP THE 8842A

## Connecting to Line Power

**WARNING**

**TO AVOID SHOCK HAZARD, CONNECT THE INSTRUMENT POWER CORD TO A POWER RECEPTACLE WITH EARTH GROUND.**

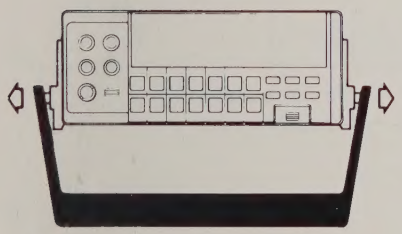
**To avoid instrument damage, check that the rear-panel line voltage selection switches are set to the power-line voltage in your area. (See below.) For fire protection with power-line voltages from 198V to 250V, replace the rear panel ¼A, 250V slo-blo fuse with the ⅛A, 250V slo-blo fuse supplied with the instrument.**

| FOR THIS LINE VOLTAGE: | USE THIS SWITCH SETTING: | FOR THIS LINE VOLTAGE: | USE THIS SWITCH SETTING: |
|---|---|---|---|
| 90V to 109V | | 198V to 229V |   |
| 109V to 132V | | 229V to 250V |   |

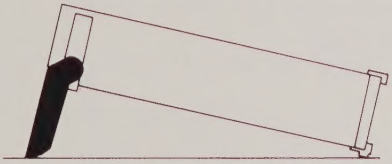
## Adjusting the Handle

The handle provides two viewing angles for bench-top use. To adjust its position, pull the ends out to a hard stop (about 1/4 inch on each side) and rotate it to one of the four stop positions shown below. To remove the handle, adjust it to the vertical stop position and pull the ends all the way out.

PULL ENDS OUTWARD
TO ROTATE

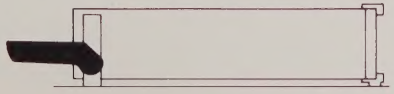


1. Viewing position

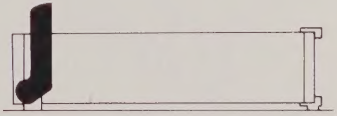


2. Alternate viewing position

3. Carrying position



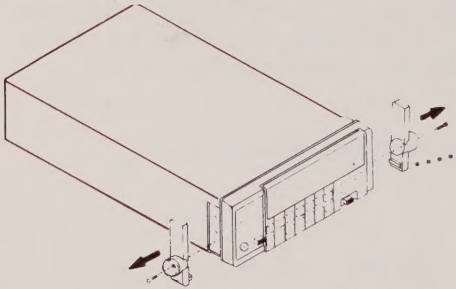
4. Removal position
(to remove, pull ends out)

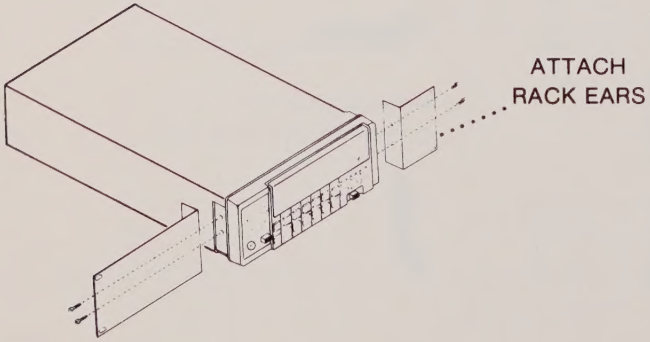


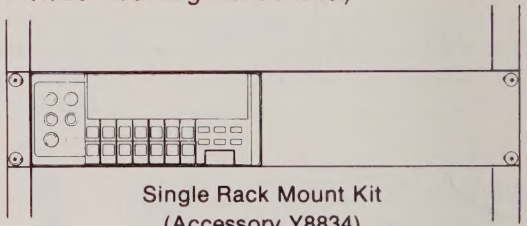
# SETTING UP THE 8842A

**Rack Mounting Kits**

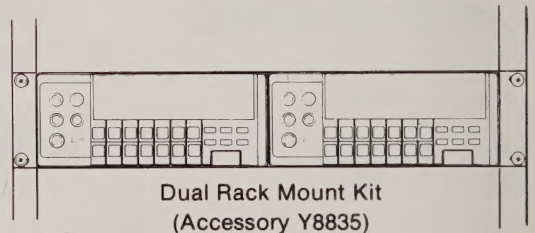
You can mount the 8842A in a standard 19-inch rack panel using the accessory rack mounting kits shown below. To install the Y8834 Single Rack Mount Kit, remove the handle and handle mounting plates, and attach the rack ears with the screws provided. The Y8835 Dual Rack Mount Kit and Y8836 Center Rack Mount Kit are installed similarly. (All kits include mounting instructions.)



Single Rack Mount Kit
(Accessory Y8834)



Dual Rack Mount Kit
(Accessory Y8835)

## Power-Up Self-Test

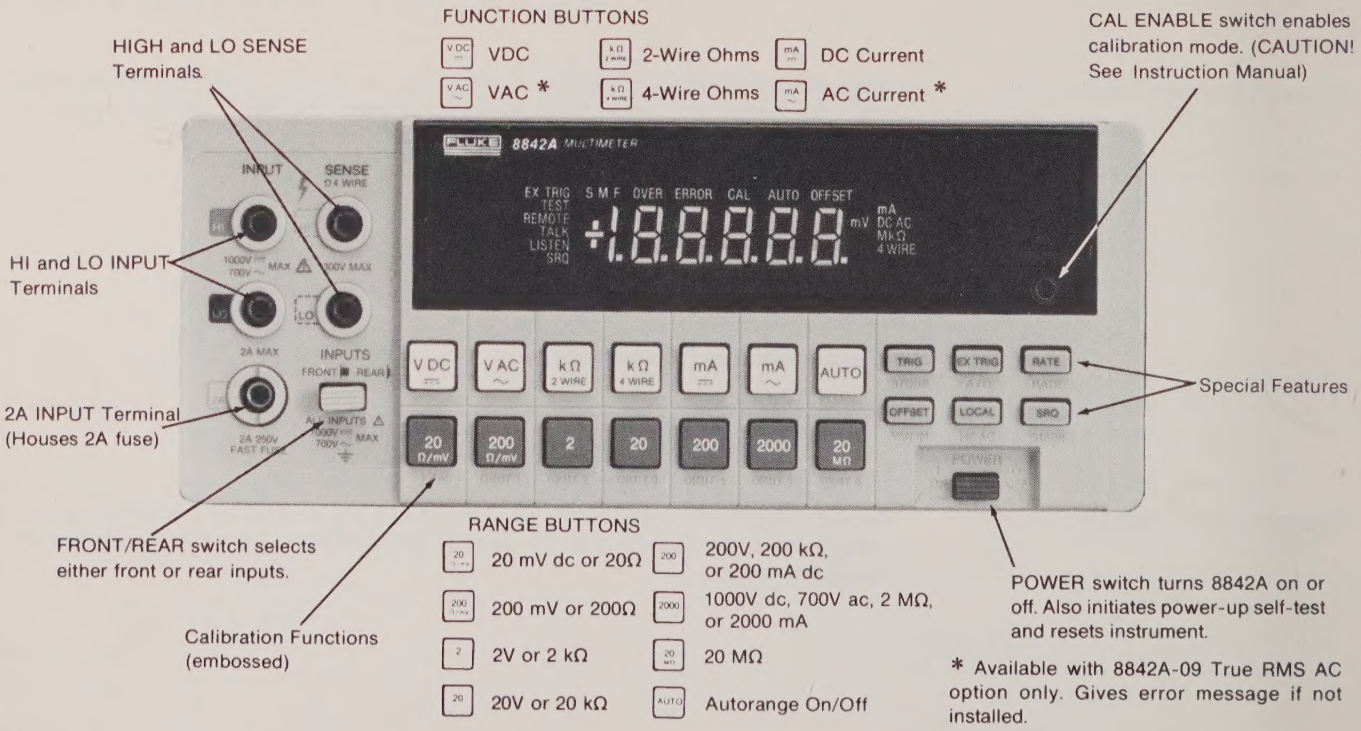
When the 8842A is turned on, all display segments light up for about 2 seconds while the instrument performs an internal self-test. The 8842A then assumes the following configuration:

- VDC function
- Autorange, starting in the 1000V range
- Slow reading rate
- Continuous, internal trigger
- OFFSET off
- Local (front panel) control

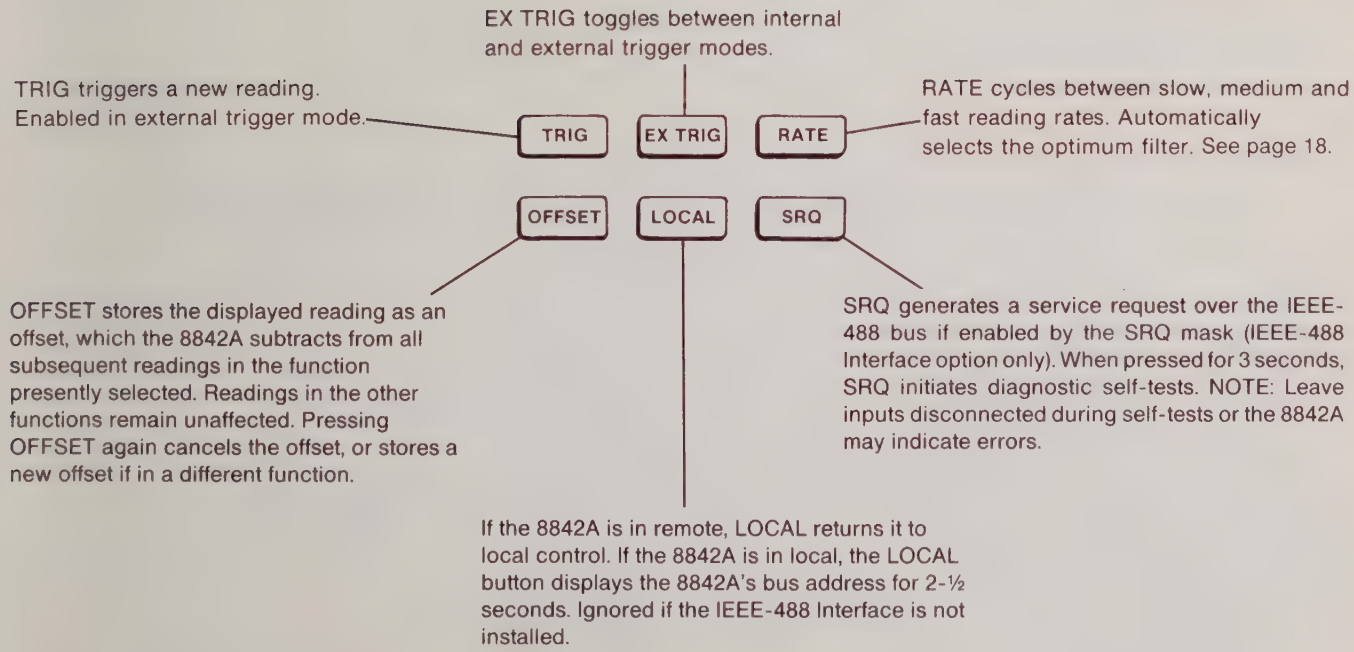
## Freezing the Display

During the power-up self-test, you can freeze the display by pressing the SRQ button while the display is lit. All display segments will then remain lit until you press any button.

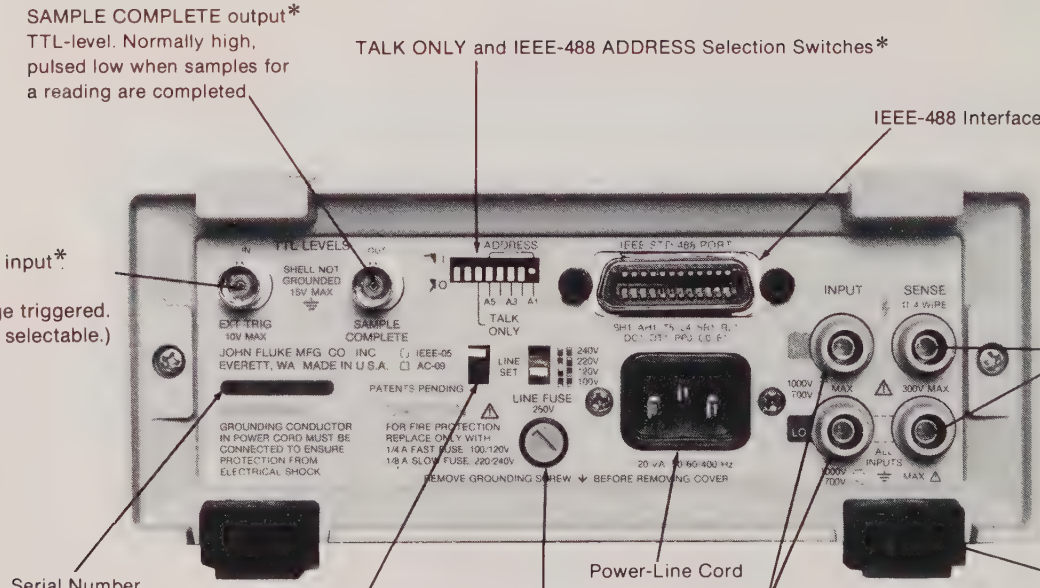
# THE FRONT PANEL



# SPECIAL FEATURES


EX TRIG toggles between internal and external trigger modes.
TRIG triggers a new reading. Enabled in external trigger mode.
TRIG
EX TRIG
RATE
RATE cycles between slow, medium and fast reading rates. Automatically selects the optimum filter. See page 18.
OFFSET
LOCAL
SRQ
OFFSET stores the displayed reading as an offset, which the 8842A subtracts from all subsequent readings in the function presently selected. Readings in the other functions remain unaffected. Pressing OFFSET again cancels the offset, or stores a new offset if in a different function.
SRQ generates a service request over the IEEE-488 bus if enabled by the SRQ mask (IEEE-488 Interface option only). When pressed for 3 seconds, SRQ initiates diagnostic self-tests. NOTE: Leave inputs disconnected during self-tests or the 8842A may indicate errors.
If the 8842A is in remote, LOCAL returns it to local control. If the 8842A is in local, the LOCAL button displays the 8842A's bus address for 2-½ seconds. Ignored if the IEEE-488 Interface is not installed.

# THE REAR PANEL

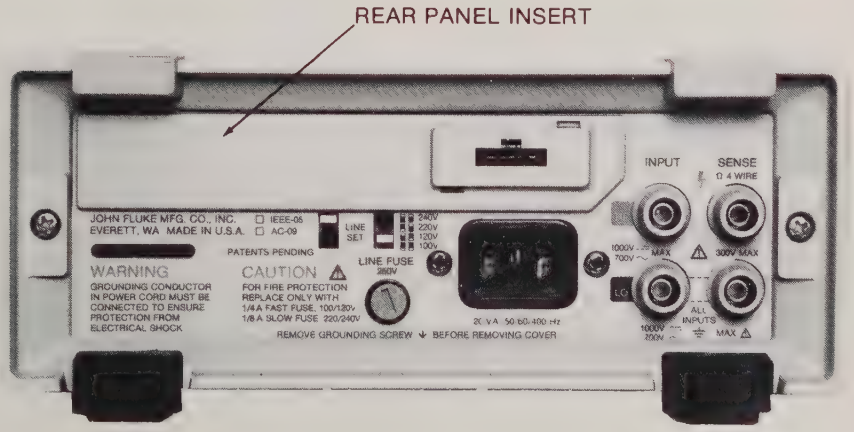

SAMPLE COMPLETE output*
TTL-level. Normally high, pulsed low when samples for a reading are completed.
TALK ONLY and IEEE-488 ADDRESS Selection Switches*
IEEE-488 Interface Bus Connector*
EXT TRIG input*
TTL-level, falling-edge triggered. (Internally selectable.)
HI and LO SENSE Terminals
Serial Number
Line Voltage Selection Switches
Power-Line Fuse
Power-Line Cord Connector
HI and LO INPUT Terminals
Rear feet rotate for rack mounting
*Available only with IEEE-488 Interface

## Rear Panel Insert

If your 8842A does not have the IEEE-488 Interface, the upper portion of the rear panel is covered by an insert as shown below. Do not remove the insert unless you are adding the IEEE-488 Interface.

**CAUTION**

**The rear panel insert is attached from inside the case. Refer to the 8842A Instruction Manual for instructions on removing it.**

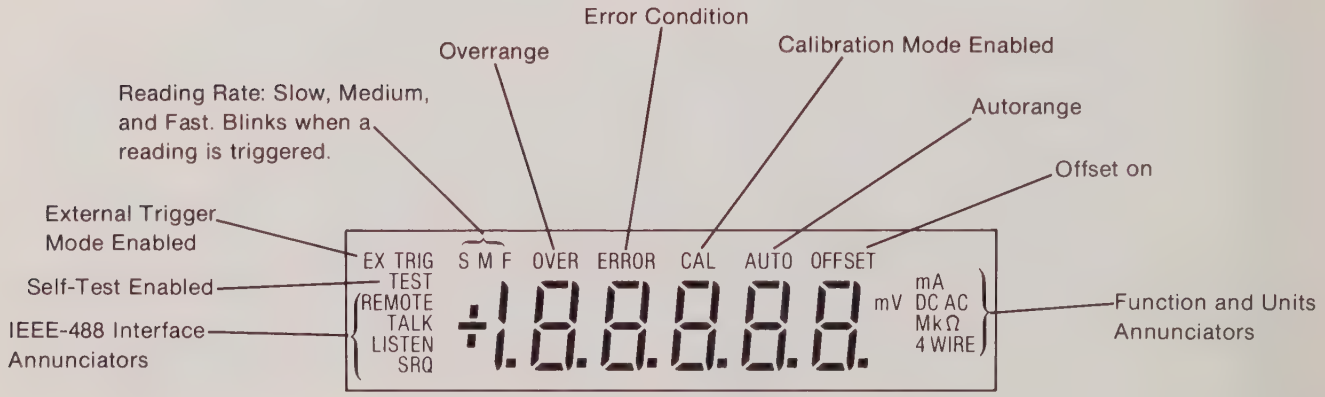


# THE DISPLAY

## The Display

The vacuum fluorescent display indicates explicit units for all functions and ranges, so you never have to interpret readings.

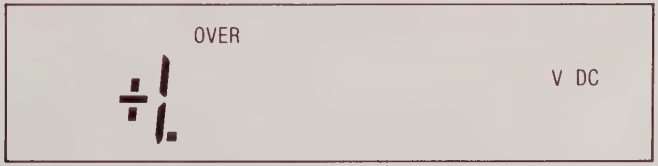
When the 8842A is in the external trigger (EX TRIG) mode, pressing any front panel button blanks the numeric field in the display until a new measurement is triggered. This ensures that all readings correspond to the instrument configuration indicated by the display annunciators.



## Overrange Indication

In most ranges the 8842A indicates the input is overrange as shown below. The sign and the position of the decimal point depend on the function and range.

As a safety feature, the 8842A treats the 1000V dc and 700V ac ranges differently. In these ranges, the 8842A indicates when the input exceeds the input overload limit of 1000V dc or 700V ac, respectively, by lighting the OVER annunciator and flashing the display. Readings are still displayed.



# THE DISPLAY

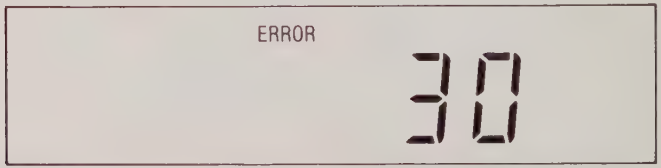
## Error Messages

If the 8842A detects an error, it displays an error message for about 2½ seconds and then resumes normal operation. During this time, the front panel buttons are ignored. The error message consists of the ERROR annunciator and a two-digit error code. Error codes are explained on the next page.

If the FRONT/REAR switch is set to the REAR position while the mA DC or mA AC function is selected, error 31 is displayed. In this case the error message is displayed until you return the switch to the FRONT position or select another function.

When you run the diagnostic self-tests (which are initiated by pressing the SRQ button for 3 seconds), be sure the input terminals are disconnected. Otherwise, the 8842A may display some of the self-test errors (errors 01 to 29).

If the 8842A displays self-test errors even when the input terminals are disconnected, there may be a hardware problem in your 8842A. In that event, refer to the 8842A Instruction Manual or contact your local Fluke representative.




Error 30: AC function selected without True RMS AC Converter option.

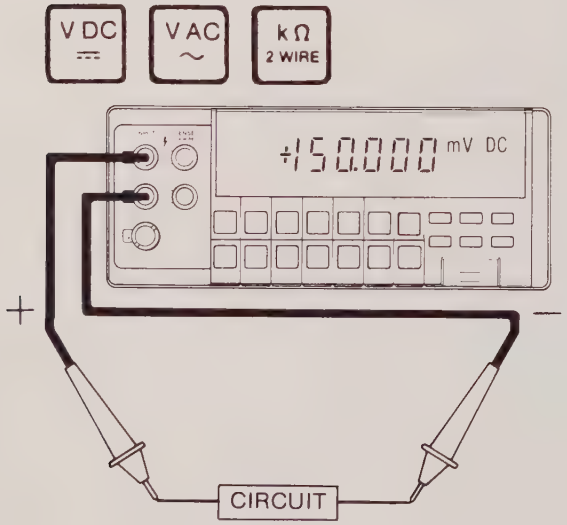
## Error Codes

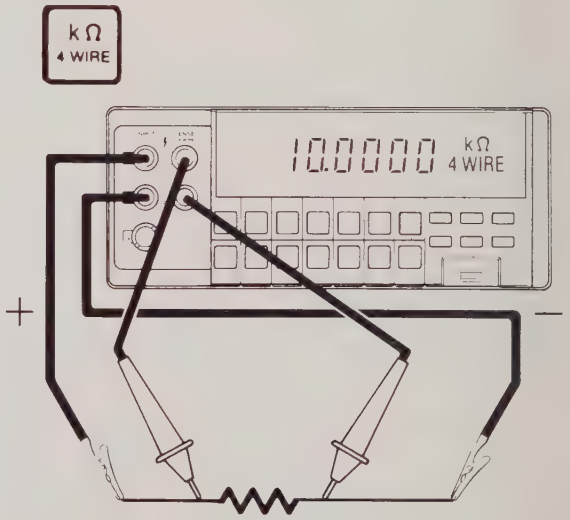
| ERROR CODE | MEANING |
|---|---|
| | SELF-TEST ERRORS |
| 01-29 | See 3842A Instruction Manual. |
| | OPERATION ERRORS |
| 30 | AC functions available only with 3842A-09 True RMS AC option. |
| 31 | mA AC or mA DC function selected while REAR inputs selected. |
| 32 | OFFSET selected with reading unavailable or overrange. |
| 40 | Computed calibration constant out of range. |
| 41 | Calibration input out of acceptable range. |
| 42 | Calibration Memory write error. |
| 50 | Guard crossing error detected by In-Guard μC. |
| 51 | Calibration command not valid unless calibration mode is enabled. |
| 52 | Command not valid at this time. Check whether 3842A is in cal mode and if so which part of the cal procedure it is in. |
| 53 | Invalid calibration value in Put command. (Example: Sending a negative value during ac calibration.) |
| 54 | Command not valid in calibration verification. |
| 56 | Variable inputs not allowed during A-D calibration. Use prompted value. |
| 60 | Device-dependent commands not valid during self-test. |
| 71 | Syntax error in device-dependent command string. |
| 72 | Guard crossing error detected by Out-Guard μC. |
| 77 | IEEE-488 interface self-test error. |

# MAKING MEASUREMENTS

**Voltage and Resistance**

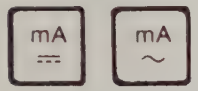
To measure voltage or resistance, select the desired function and connect the test leads as shown. Resistance can be measured in either the 2-wire or 4-wire configuration.



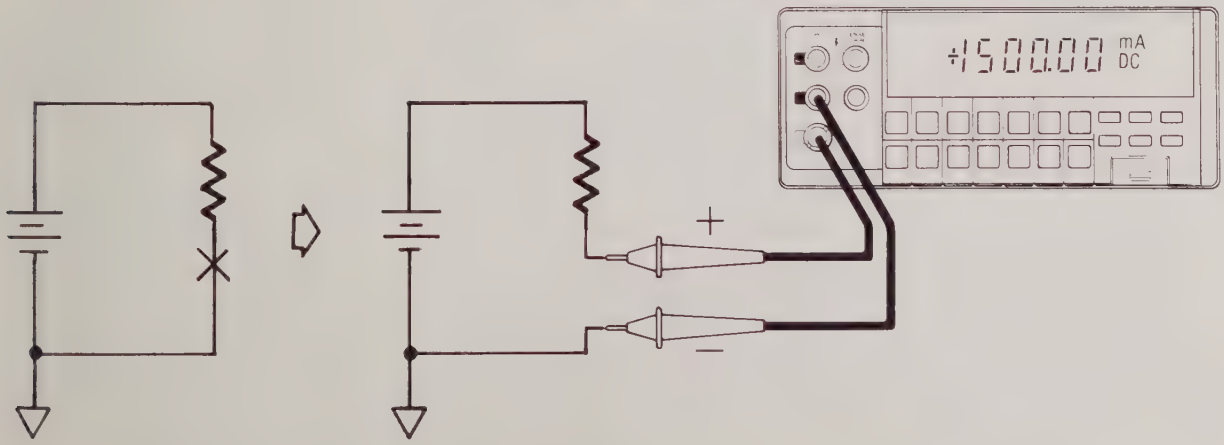
# MAKING MEASUREMENTS

**Current**




To measure current, select the desired function and connect the test leads as follows:

1. Turn off power in the circuit to be measured.
2. Break the circuit (preferably on the ground side to minimize the common mode voltage), and place the 8842A in series at that point.
3. Turn on power in the circuit, and read the display.
4. Turn off power in the circuit, and disconnect the 8842A.



# MAKING MEASUREMENTS

## Offset Measurements

**WARNING**

**WHEN THE OFFSET FEATURE IS IN USE, DISPLAYED READINGS ARE RELATIVE AND MAY NOT INDICATE THE PRESENCE OF DANGEROUS POTENTIALS AT THE INPUT CONNECTORS OR TEST LEADS. USE CAUTION TO AVOID ELECTRIC SHOCK OR INSTRUMENT DAMAGE.**

The OFFSET button stores a reading so that you can make relative measurements. When an offset is in use, the display always has a + or - sign (even in the resistance and ac functions) since the reading represents a numeric difference.

The range buttons select among the available measurement ranges as shown on page 8. In the 20 mV dc, 20Ω, and 200 mA dc ranges, select the slow (S) reading rate to minimize the effect of noise. Select the medium (M) or fast (F) reading rate for higher measurement speed.

**RANGE SELECTION AND READING RATES**

| RANGE | SELECTION METHOD | READING RATE(readings per second) | | |
|---|---|---|---|---|
| | | S | M | F |
| 20 mV dc, 20Ω, and 200 mA dc ranges | Select the range. | 0.31 | 1.25 | 100 |
| All other ranges | Select the range or autorange. | 2.50 | 20 | 100 |

## Overload Protection Limits

**WARNING**

**TO AVOID SHOCK HAZARD AND/OR INSTRUMENT DAMAGE, DO NOT APPLY INPUT POTENTIALS THAT EXCEED THE OVERLOAD PROTECTION LIMITS SHOWN BELOW.**

**INPUT OVERLOAD PROTECTION LIMITS**

| FUNCTION | CONNECTORS | MAXIMUM INPUT |
|---|---|---|
| VDC | INPUT HI and LO: | 1000V dc |
| mA DC | 2A INPUT and INPUT LO: | 2000 mA |
| 2 WIRE/4 WIRE kΩ | INPUT HI and LO:<br>SENSE HI and LO: | 300V rms<br>300V rms |
| VAC | INPUT HI and LO: | 700V rms, 1000V peak or $2 \times 10^7$ V-Hz (whichever is less) |
| mA AC | 2A INPUT and INPUT LO: | 2000 mA rms |
| All Functions | Any terminal to earth: | 1000V dc or peak ac |

# REMOTE OPERATION

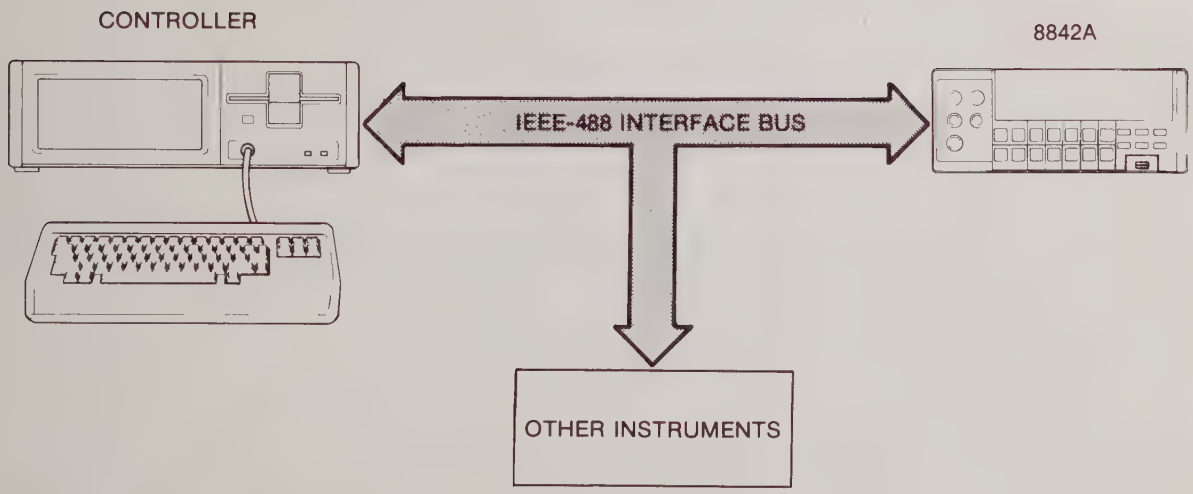
**The IEEE-488 Interface**

The IEEE-488 Interface option turns the 8842A into a fully programmable systems instrument for remote operation over the IEEE Standard 488-1978 interface bus.

The 8842A can be under complete, interactive control from a remote bus controller. Or when set to the talk-only mode, the 8842A can be connected to a printer or data logger and dedicated to a single task.

For an introduction to the IEEE-488 interface bus, request Fluke Application Bulletin AB-36, "IEEE Standard 488-1978 Digital Interface for Programmable Instrumentation.

# REMOTE OPERATION



# REMOTE OPERATION

## Connecting to the IEEE-488 Interface

To set up the 8842A on the IEEE-488 bus,

1. Set the 8842A IEEE-488 address using the rear panel IEEE-488 ADDRESS switches (see next page).

2. Plug an IEEE-488 cable into the 8842A rear panel IEEE-488 connector, secure it, and connect the cable to one of the other instruments in your system.

3. Switch on the 8842A.

Whenever the 8842A is under local control, its IEEE-488 address can be displayed on the front panel by pressing the LOCAL button. The address is displayed with a minus sign if the 8842A is set to the talk-only mode.

**REAR PANEL ADDRESS SETTINGS**

| ADDRESS | TALK ONLY | A5 | A4 | A3 | A2 | A1 |
|---|---|---|---|---|---|---|
| 00 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01 | 0 | 0 | 0 | 0 | 0 | 1 |
| 02 | 0 | 0 | 0 | 0 | 1 | 0 |
| 03 | 0 | 0 | 0 | 0 | 1 | 1 |
| 04 | 0 | 0 | 0 | 1 | 0 | 0 |
| 05 | 0 | 0 | 0 | 1 | 0 | 1 |
| 06 | 0 | 0 | 0 | 1 | 1 | 0 |
| 07 | 0 | 0 | 0 | 1 | 1 | 1 |
| 08 | 0 | 0 | 1 | 0 | 0 | 0 |
| 09 | 0 | 0 | 1 | 0 | 0 | 1 |
| 10 | 0 | 0 | 1 | 0 | 1 | 0 |

| ADDRESS | TALK ONLY | A5 | A4 | A3 | A2 | A1 |
|---|---|---|---|---|---|---|
| 11 | 0 | 0 | 1 | 0 | 1 | 1 |
| 12 | 0 | 0 | 1 | 1 | 0 | 0 |
| 13 | 0 | 0 | 1 | 1 | 0 | 1 |
| 14 | 0 | 0 | 1 | 1 | 1 | 0 |
| 15 | 0 | 0 | 1 | 1 | 1 | 1 |
| 16 | 0 | 1 | 0 | 0 | 0 | 0 |
| 17 | 0 | 1 | 0 | 0 | 0 | 1 |
| 18 | 0 | 1 | 0 | 0 | 1 | 0 |
| 19 | 0 | 1 | 0 | 0 | 1 | 1 |
| 20 | 0 | 1 | 0 | 1 | 0 | 0 |
| 21 | 0 | 1 | 0 | 1 | 0 | 1 |

| ADDRESS | TALK ONLY | A5 | A4 | A3 | A2 | A1 |
|---|---|---|---|---|---|---|
| 22 | 0 | 1 | 0 | 1 | 1 | 0 |
| 23 | 0 | 1 | 0 | 1 | 1 | 1 |
| 24 | 0 | 1 | 1 | 0 | 0 | 0 |
| 25 | 0 | 1 | 1 | 0 | 0 | 1 |
| 26 | 0 | 1 | 1 | 0 | 1 | 0 |
| 27 | 0 | 1 | 1 | 0 | 1 | 1 |
| 28 | 0 | 1 | 1 | 1 | 0 | 0 |
| 29 | 0 | 1 | 1 | 1 | 0 | 1 |
| 30 | 0 | 1 | 1 | 1 | 1 | 0 |
| 31 | Not allowed | | | | | |
| TALK ONLY | 1 | X | X | X | X | X |
| | X = setting does not matter | | | | | |

# REMOTE OPERATION

## Talk-Only Mode

The talk-only mode lets you take advantage of the remote capability of the 8842A without having to use an instrument controller. To put the 8842A in the talk-only mode:

1. Turn the 8842A POWER switch OFF.
2. Set the rear panel TALK ONLY bit switch to 1 (the up position).
3. Connect the 8842A via the IEEE-488 bus to your printer, data logger, or other device.
4. Configure the other device as a listener only.
5. Turn the 8842A POWER switch ON.

## Remote Programming

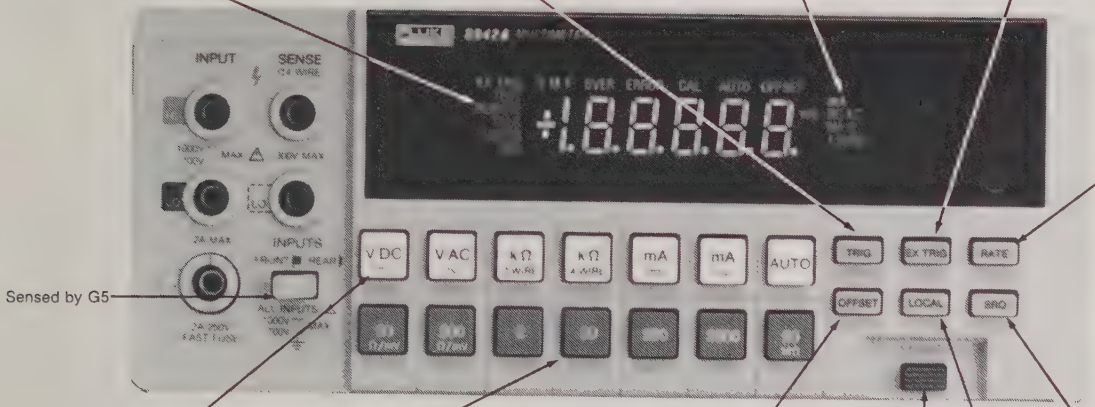
The 8842A device-dependent command set makes remote operation much like front panel operation. The following page shows the device-dependent commands that correspond directly to the front panel. For complete programming instructions, including a complete list of device-dependent commands, refer to the 8842A Instruction Manual.

**DISPLAY COMMANDS**
D0 Normal Display
D1 Blank Display

**TRIGGER COMMANDS**
? Trigger Measurement
GET Trigger and Execute

**SUFFIX COMMANDS**
Y0 Disable Suffix
Y1 Enable Suffix

**TRIGGER MODE COMMANDS**
T0 Continuous Trigger
T1-T4 External Trigger




**READING RATE COMMANDS**
S0 Slow
S1 Medium
S2 Fast

Sensed by G5

**FUNCTION COMMANDS**
F1 VDC
F2 VAC
F3 2 WIRE kΩ
F4 4 WIRE kΩ
F5 mA DC
F6 mA AC

**RANGE COMMANDS**
R0 Autorange On
R1 200 mV, 200Ω
R2 2V, 2 kΩ
R3 20V, 20 kΩ
R4 200V, 200 kΩ, 200 mA dc
R5 1000V dc, 700V ac, 2 MΩ, 2000 mA
R6 20 MΩ
R7 Autorange Off
R8 20 mV dc, 20Ω

**OFFSET COMMANDS**
B0 Offset Off
B1 Offset On

**SELF-TEST COMMAND**
Z0 Begin Self-Tests

GTL Go To Local

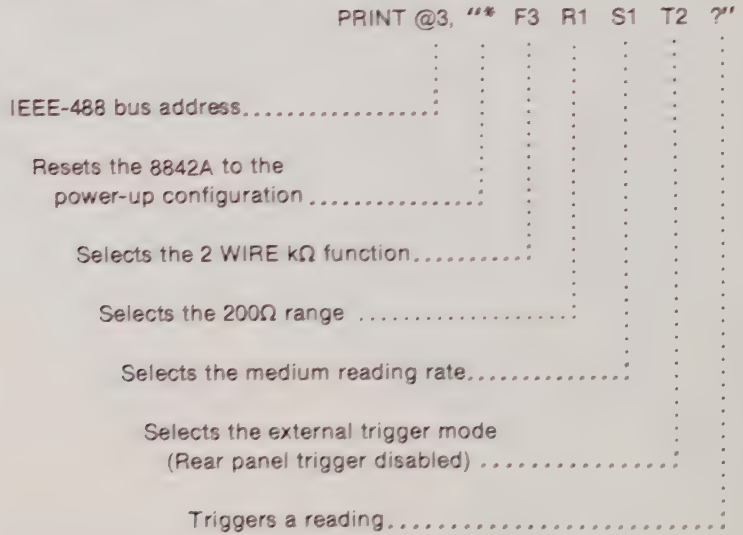
**DEVICE-CLEAR COMMAND**
* Reset 8842A to power-up state

See the 8842A Instruction Manual for a complete list of commands.

# REMOTE OPERATION

## Typical Command String

Here is a typical command string as it might be sent from a Fluke 1722A Instrument Controller. The string configures the 8842A and triggers a reading. The PRINT command automatically sends terminators (CR, LF, and/or EOI) to the 8842A at the end of the command string.


PRINT @3, "* F3 R1 S1 T2 ?"
IEEE-488 bus address
Resets the 8842A to the power-up configuration
Selects the 2 WIRE kΩ function
Selects the 200Ω range
Selects the medium reading rate
Selects the external trigger mode (Rear panel trigger disabled)
Triggers a reading

## Programming Example

The following program was written in Fluke BASIC for the Fluke 1722A Instrument Controller. The program assumes the 8842A ADDRESS switches are set to address 3.

```
10  THIS EXAMPLE SELECTS VDC (F1), AUTORANGE (R0), SLOW READING RATE (S0),
20  AND EXTERNAL TRIGGER WITH REAR PANEL TRIG DISABLED AND DELAY ENABLED (T2).
30  THE CONTROLLER IS A FLUKE 1722A. THE 8842A IS SET TO IEEE-488 ADDRESS 3.
40  THE PROGRAM TAKES ONE READING AND THEN STOPS.
100 INIT PORT 0                          !CLEAR INTERFACE (SENDS IFC)
200 CLEAR PORT 0                         !CLEAR 8842A TO POWER-UP STATE (SENDS DCL)
300 PRINT #3, "F1 R0 S0 T2 "             !CONFIGURE AND TRIGGER 8842A
400 INPUT #3, R                          !GET DATA FROM 8842A
500 PRINT R                              !PRINT DATA ON 1722A SCREEN
600 END
```

## Other Controllers

Every controller handles IEEE-488 commands somewhat differently. If you are using a controller other than the 1722A, refer to your controller's programming manual for details. Examples using several popular controllers are given in the 8842A Instruction Manual.

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